

**Department of Conservation  
California Abandoned Mine Lands Forum  
1027 10<sup>th</sup> Street  
Sacramento, CA**

**August 13, 2003  
Meeting Notes**

Facilitator and Meeting Summary: Carol Atkins, Harris & Company

**Attendees:**

Charlie Alpers, USGS	David Bieber, Geocon Consultants
Pete Brost, USFS Tahoe National Forest	John Clinkenbeard, DOC –Geologic Survey
Doug Craig, Department of Conservation	Sean Dunbar, Holdrege & Kull
Mike Fuller, Department of Conservation	Joe Haskell, Geocon Consultants
Clayton Haas, Department of Conservation	Sam Hayashi, Department of Conservation
Darcy Jones, SWRCB	Kyle Leach, Holdrege & Kull
G. Fred Lee, G. Fred Lee & Associates	Sandra Lunceford, Camp, Dresser, McKee
Patrick Morris, CVRWQCB	Eugene Mullenmeister, Shaw Environmental
Donna Podger, CA Bay-Delta Authority	Sarah Reeves, Department of Conservation
Greg Schimke, USFS Tahoe National Forest	Rick Weaver, USFS – Tahoe Forest
Megan Williams, CA Bay-Delta Authority	Becky Wood, Teichert Aggregates

**Agenda:**

- I. Welcome
- II. Introductions and Agenda Review
- III. Presentations
  - Abandoned Mine Lands Assessment Report, North Yuba River
  - US Forest Service's Tahoe National Forest Abandoned Mine Lands Program
  - USGS Abandoned Mine Lands Studies, Northern Sierra Nevada
- IV. Update on DOC/CALFED Abandoned Mines and Legal Workgroups
- V. Discussion: Clarification of Forum Role (advisory vs. task oriented vs. legislative)
- VI. Next Meeting

**Meeting**

**I. Welcome**

Doug Craig, manager of the Abandoned Mine Lands Unit (AMLU) for the Office of Mine Reclamation of the Department of Conservation, welcomed attendees. He reminded participants that the State programs investigating and working on abandoned mines are housed in many different agencies and that the goal for this Forum is to create greater dialog on the issues that these respective agencies are working on, as well as incorporating dialog with local and federal agencies, and

industry. Doug also recognized the California Bay-Delta Authority for providing funding for the Forum.

In addition, Doug noted that a concerted effort would be made not overlap with other existing dialog efforts, and recognized those efforts ongoing in the Sacramento area – the Delta Tributaries Mercury Council, the Sierra-Trinity Abandoned Mine Lands Agency Group and the Sacramento Regional County Sanitation District’s Offsets Workgroup. He also encouraged participants to forward ideas for future meeting topics.

Forum meeting notes and presentations are being posted on the Department of Conservation website:

[http://www.consrv.ca.gov/OMR/abandoned\\_mine\\_land/amlu\\_forum.htm](http://www.consrv.ca.gov/OMR/abandoned_mine_land/amlu_forum.htm)

## **II. Meeting Format and Agenda Review**

**Introductions:** Meeting participants introduced themselves.

**Agenda Review:** Carol reviewed the agenda with the group; no changes were made.

## **III. Presentations:**

### **Abandoned Mine Lands Assessment of North Yuba Watershed**

Sarah Reeves with the Department of Conservation (DOC) Abandoned Mine Lands Unit (AMLU) gave a presentation on the DOC AMLU report on a recently conducted assessment of the extent and nature of abandoned mine lands within the North Yuba watershed. The California Bay-Delta Authority contracted with the Department of Conservation to perform an assessment of the abandoned mines in this watershed. The North Yuba watershed was selected based on water flow to the Bay-Delta and use of several geo-spatial data sets: mining history, watersheds, watershed boundaries, arsenic occurrences, acid rock drainage occurrences, and ownership. Sarah reviewed the data sets and the output from the watershed analysis, and then focused her presentation on specifics about the North Yuba watershed.

A general description of the North Yuba watershed included:

- Located in the northern Sierra Nevada mountain range
- Lies mostly within Sierra County
- Watershed drains approximately 127,116 hectares (314,106 acres) from the crest of the Sierra westward to New Bullards Bar Dam
- Land ownership is mixed with approximately 76% publicly owned by US Forest Service and Bureau of Land Management, 23% is privately owned, and 1% is owned by State agencies.
- Subwatersheds include
  - Goodyears Bar: ~132,000 acres
  - Sierra City: ~91,000
  - Bullards Bar: ~52,000
  - Slate Creek: ~40,000

Mining history for the watershed included:

- Very productive gold mining region (placer, drift, and lode mining)
- Watershed included 15 distinct mining districts with the most productive being La Porte, Sierra City, Downieville, and Poker Flat districts
- The La Porte district alone produced more than \$60 million in placer gold, mostly by hydraulic mining, from 1855 to 1871

The assessment in the North Yuba watershed involved approximately 60 days of fieldwork to visit 128 mines. The data gathered from the fieldwork was combined with historical and modern literature research to form the North Yuba Watershed databases.

Sarah reviewed photographs from several of the mine sites, data from the initial soil analyses, and PAR scores. She reminded attendees that the Preliminary Appraisal and Ranking Model (PAR) is based on both physical and chemical characteristics observed onsite at the time of the visit. It uses some field test data such as pH, redox, and EC. The PAR scores are relative to the other mine assessments that have been conducted by DOC staff and whose data reside in the database. Two lists were developed. The first was based on just the chemical PAR score. The second was based on a combination of the chemical PAR score and the soil sample results for the sites that were sampled (for this watershed, a total of 45 samples were sampled). The two lists are developed because the number of sites sampled (45) was less than 50% and all the sites visited (128). Sarah reminded the group that the inventory provides a preliminary assessment on which more detailed investigations can be based.

Questions included:

**Q:** Regarding the maximum size of the material collected for soil sample analysis, how did you determine the size fraction in the field to sample?

**A:** We tried to collect samples with sand as the largest size fraction, though this was difficult to implement.

**Q:** Where did you sample within a large tailings pile?

**A:** This was really a function of the characteristics of the pile. If the pile material was uniform in appearance, the sample would be taken from one location; if the pile was heterogeneous in nature, then a composite sample would be taken.

**Q:** Is the database available on-line?

**A:** It is best to contact AMLU staff regarding use of the database.

**Q.:** What are the next steps to actually conduct remediation at a site?

**A.:** It is probably appropriate to conduct greater site characterization prior to launching a remediation effort.

**Q.:** Have samples been archived so that metal solubility could be further tested?

**A.:** Yes. Some of the samples have been archived.

A copy of the presentation or of the report can be downloaded from:

[http://www.consrv.ca.gov/OMR/abandoned\\_mine\\_land/Abandoned%20Mine%20Lands%20Assessment%20of%20the%20North%20Yuba.pps](http://www.consrv.ca.gov/OMR/abandoned_mine_land/Abandoned%20Mine%20Lands%20Assessment%20of%20the%20North%20Yuba.pps)

[http://www.consrv.ca.gov/OMR/abandoned\\_mine\\_land/North%20Yuba.pdf](http://www.consrv.ca.gov/OMR/abandoned_mine_land/North%20Yuba.pdf)

### **Tahoe National Forest Abandoned Mine Lands Program**

Rick Weaver and Greg Schimke gave an overview of the Tahoe National Forest (TNF) Abandoned Mine Lands Program. Rick explained that staff at the TNF has used the data collected by the Department of Conservation to determine where to focus more in depth characterization.

Rick noted that the TNF's minerals management program has approximately 9,000 active mine claims, each between 20 to 160 acres, and 1, 756 approved active plans of operation. There are four personnel working on this program.

The TNF's Abandoned and Inactive Mines Program began in 1993. The Abandoned and Inactive Mine Survey that was conducted between 1993 – 1998 showed hazardous substances release, erosion and sediment problems and hazardous mine openings to be an issue on USFS lands. In general, the TNF's AML inventory shows 363 total mine sites with 158 hard rock mines and 195 placer gold mines (of which 22 were hydraulic mines). Point sources contributing to contamination of waterways include: drain tunnels, sluice cuts, wetlands and pit lakes, and debris dams. Rick is the sole staff assigned to work on abandoned mines within the TNF.

USFS has received monies under CERCLA to implement remediation (a removal action) at Sailor Flat. The standard process followed for CERCLA includes: a search for potentially responsible parties (PRPs), site characterization, engineering evaluation and cost analysis (EE/CA), assembling a site management team, and development of a community relations plan. Sailor Flat was chosen by the Forest Service because it lies entirely on public lands, it has physical features contributing to mercury runoff (e.g., drain tunnel, sluice box, sluice cuts) and it drains directly to Greenhorn Creek. There are also concerns that some features of the site may be conducive to the methylation of mercury based on sampling of water, sediment, invertebrates, and frogs by USGS in 1999-2002.

Rick reviewed different funding sources that the USFS has to support mine remediation work, reviewed the federal CERCLA process, and concluded the presentation with slides showing the effects of abandoned mine sites within the TNF, which includes sediment loading to stream channels, iron flocculation in streams, squatters, leaving behind of large equipment, hazardous waste, and other

junk by squatters, hazardous mine openings, discharge water that often threatens aquatic life, and unknown affects on local groundwater aquifers. He also showed slides of recent reclamation projects that have decommissioned roads (to reduce sediment impacts on streams), bat friendly closures to hazardous mine openings, stream bank restoration and plugging of adits to reduce discharge to streams.

Questions included:

**Q.:** Does the issue of historical landmark ever enter into/affect efforts to conduct remediation effort?

**A.:** Sometimes it does; the Forest Service is careful to evaluate this issue prior to conducting a remediation or removal action.

**Q.:** Are the bonds that are issued adequate to address cleanup?

**A.:** Not usually. Sometimes mine operators will operate outside the conditions of their permit.

**Q:** Does El Dorado County have a similar Abandoned Mines Program?

**A.:** No; however, Plumas County does.

### **USGS Projects – Overview of Abandoned Mine Lands Studies in the Northern Sierra Nevada**

Charlie Alpers gave a presentation on recent studies that the USGS has undertaken with various state, federal, and local agency partners to further characterize mine sites to provide a foundation of scientific data to better inform potential remediation efforts.

Charlie reviewed placer and hard-rock gold mining and mercury use in the northern Sierra Nevada and noted that:

- Significant dredging occurred in all rivers draining the Sierra Nevada
- Highest intensity of hydraulic mining (placer gravel deposits) occurred in the Bear-Yuba rivers watersheds
- Up to 8,000,000 pounds of mercury were lost during gold processing in Sierra Nevada (Alpers and Hunerlach, 2000)
- Of the northern Sierra Nevada watersheds, the Bear-Yuba rivers have the highest mercury in biota (Slotton et al., 1997) and were the most intensely mined (Alpers and Hunerlach, 2000)

Charlie reviewed mercury environments, transport, and transformations. Mercury environments include:

- Hydraulic gold mines – Sierra Nevada
- Mercury mines – Coast Ranges
- Mountain streams above reservoirs
- Foothill reservoirs
- Rivers below reservoirs – gold dredging environments
- Floodplain deposits
- San Francisco Bay-Delta estuary

Chemical speciation within these environments was discussed. Charlie indicated that authors are now including the amalgam form of mercury in diagrams as it is a major form of mercury that is transported when present in sediment; the reactivity of gold-mercury amalgam remains unknown.

Charlie discussed sampling sites on the Bear and Yuba rivers watersheds, which are part of several ongoing USGS mercury studies, including:

- Bear River mercury loading, 1999-2001 (SWRCB, USGS)
- Bear River mercury cycling, 2001-2003 (SWRCB, USGS)
- Bear-Yuba-Trinity Abandoned Mine Lands, 1999-2004 (USGS, USFS, BLM, NCRCD, SWRCB)
- Upper Yuba River Studies Program, 2000-2005 (CALFED)
- Daguerre Point Sediments, 2001-2003 (USBR, CDFG, DWR)

Other USGS mercury projects outside of the Bear and Yuba rivers watersheds include:

- Lake Natoma and tributaries, 2002-2004 (USBR, DWR, USGS)
- Cache Creek-Yolo Bypass-Delta Hg study, 2000-2001 (CALFED)
- Clear Creek (Shasta County), 2001-2004? (CALFED, BLM)
- Trinity River Restoration Program, 2003- (USBR, BLM)

Charlie focused the rest of his presentation on the Bear –Yuba AML Project. The scope of the AML project includes:

- Monitoring of total and methyl mercury loads in main-stem rivers and tributaries
- Monitoring of mercury in sport fish in lakes and streams
- Site characterization of mercury “hot spots”
  - water quality and discharge rates
  - sediment chemistry
  - mercury bioaccumulation (aquatic invertebrates, amphibians, and fish)
- Identification of candidate sites for pilot remediation projects on federal lands

Charlie presented some project data for total and methyl mercury in water, biota, and sediment and reviewed a preliminary report schedule.

Following the Forum meeting, Charlie presented information about the Upper Yuba Rivers Studies Program – Water Quality and Sediment Studies with project tasks that include:

- Monitoring of mercury and methyl mercury loads in and out of Englebright Lake
  - Also nutrients, organic carbon, trace elements
- Determining concentrations of mercury, methyl mercury, gold, and trace metals in Lake Englebright sediments
- Determining methylation potential of mercury

- sediments from lake and downstream of dam
- Sampling fish and invertebrates from Lake Englebright
  - mercury vs. size relationships for various species
  - angler survey to see what's being caught & eaten
- Sampling fish and invertebrates from upstream and downstream environments
  - juvenile rainbow trout as proxy for steelhead
  - native small fish and invertebrates for spatial mercury variations

and the Bear River Mercury Cycling Project with the goals to:

- Provide technical support to TMDL process
- Determine mercury and methyl mercury mass balance in two reservoirs on Bear River (7/01 - 6/03)
- Detailed study of mercury cycling in Camp Far West Reservoir (10/01 - 9/03)
  - Benthic fluxes of mercury, methyl mercury, hydrogen sulfide, nutrients, and silica
  - Methylation / demethylation potential of sediments
  - Water-quality profiles
- Temperature, pH, specific conductance, dissolved oxygen
  - Food web study – Mercury bioaccumulation
- Mercury, methyl mercury, and carbon, nitrogen & sulfur isotopes in zooplankton, invertebrates, fish

#### **IV. Update on DOC/CALFED Abandoned Mines and Legal Workgroups**

Doug Craig updated the group on two workgroups that the Department of Conservation is hosting:

- (1) Abandoned Mines Workgroup, which consists of state and federal agency staff, and is focused on developing recommendations for CALFED staff to consider when developing the Proposal Solicitation Package for the Proposition 13 Abandoned Mine Remediation Funds, and
- (2) Legal Workgroup, which consists of state and federal agency attorneys and is focused on developing a manual to assist agency managers in determining whether to proceed with a mine remediation project based on current laws and legal decisions.

The Abandoned Mines Workgroup is finishing their draft report and the Legal Workgroup is revising the current outline and writing their draft document.

#### **V. Clarification of Forum Role/Meeting Format**

Carol reviewed the current format of the forum meetings, which includes presentations and facilitated discussions on topics identified by meeting participants. Meeting attendees indicated that they liked the current structure and would like to see it continued.

## **VI. Next Meeting**

The next meeting has been scheduled for November 12, 2003. It will be held from 9 to noon at the sixth floor conference room at 1027 10<sup>th</sup> Street.

The following topics were suggested for future meetings:

- Cleanup Technologies
- Creative Cleanup Efforts
- Presentation of a Reclamation Plan
- California Environmental Quality Act
- Mine activation “hoops”
- Presentation on cleanups/remediation efforts at mines such as Iron Mountain Mine, Leviathan, and Penn Mine – Charlie Alpers noted that US EPA and USGS have been discussing a potential symposium on Iron Mountain Mine
- Presentation on metals bioavailability
- A legislative updates agenda item, which could possibly be posted on the Web site – it was noted that the Association of Engineering Geologists prepare this type of information
- Cleanup levels used at mine sites

Carol will follow up on suggestions and develop an agenda for the November meeting.